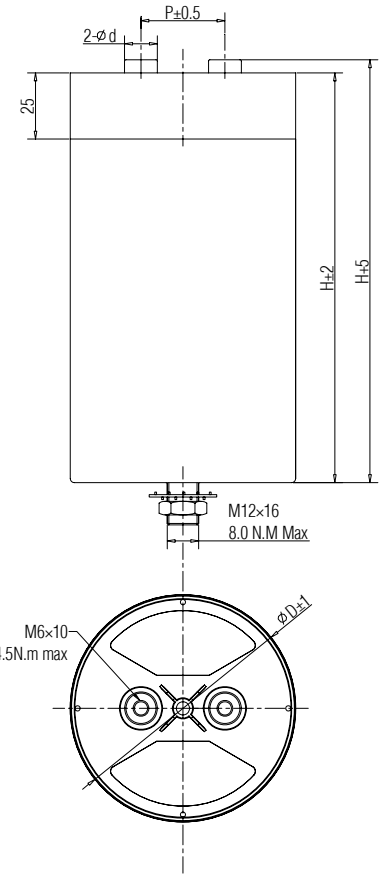
GENERAL TECHNICAL CHARACTERISTICS

Reference standards :	IEC 61071
Dielectric :	Polypropylene film
Construction :	Dry construction, Non-inductive type.
Coating :	Cylinder aluminum case



ELECTRICAL CHARACTERISTICS

Capacitance :	**Cn**	420	μF ±10%
Rated voltage :	**Un**	1100	VDC
Non-recurrent surge voltage :	**Us**	1650	V
Max. ripple voltage:	**Ur**	250	V
Maximum current:	**Irms**	40	A @10KHz ,45˚C
Maximum peak current:	**Ipeak**	2.0	KA
Series resistance::	**ESR**	2.2	mΩ @1.0KHz
Voltage rise time :	**Du/dt**	4.8	V/us
Self inductance:	**Ls**	50	nH
Rated energy:	**Wn**	254	Ws
Dielectric Dissipation Factor :	**Tanδ0**	2×10^{-4}	
Thermal resistance:	**Rth**	3.0	K/W
Lowest operating temperature :	**Tmin**	- 40	˚C
Maximum operating temperature :	**Tmax**	+ 85	˚C
Storage temperature:	**Tstorage**	-40..+ 85	˚C

DIMENSIONS AND MECHANICAL DATA

Rated diameter:	**D**	86	mm
Height of the case:	**H**	136	mm
Distance of terminals:	**P**	32	mm
Terminal diameter:	**d**	12.5	mm
Clearance in air:	**L**	19.5	mm
Creepage distance:	**K**	33	mm

TEST METHODS AND PERFORMANCES

Dielectric strength:	**Ut-t**	1.5Un (DC) applied to 10s at 20±5˚C
Test voltage terminal to case:	**Ut-c**	(1.5Un+1000) VAC, Min 3000VAC, for 60s
Insulation resistance :	**I.R.**	≥10000 s, after 1 minute of electrification, at 100VDC (20±5˚C)
Dissipation factor:	**Tanδ**	$\leqslant 3\times10^{-3}$ Measured at 100 Hz and 20±5˚C
Life expectancy:	**Le**	100,000 hours at Un and 70 ˚C (Hot-spot temperature)

PROTECTION AGAINST OVERVOLTAGE

1.1 × Un	30% of the service period
1.15 × Un	30 min/d
1.2 × Un	5 min/d
1.3 × Un	1 min/d
1.5 × Un	100 ms no more than 1000 times

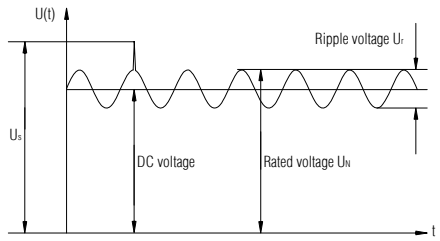
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Date：2015-03-14

1. Technical Terms and Definitions

1.1 Rated Capacitance C_n
The rated capacitance measured at 20±5°C , 1 KHz .

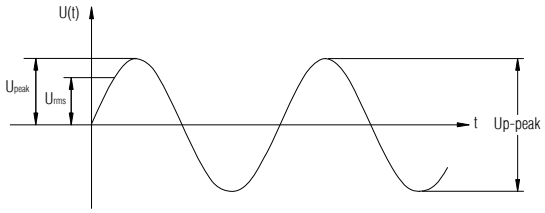
1.2 Rated Voltage U_n
The maximum or peak voltage of either polarity of non-reversing type wave form for which the capacitor has been designed and rated.



1.3 Non Repetitive Peak (non-recurrent surge) Voltage U_s
Voltages beyond the rated voltage induced by switching or faults of the system or any part of it. Maximum count 1000 times with the duration of not more than 50 ms each.

1.4 Ripple Voltage U_r
The peak-to-peak alternating component of the unidirectional voltage

1.5 Rated A.C Voltage U_{rms}
Root mean square of the max. permissible value of sinusoidal AC voltage in continuous operation



1.6 Rated A.C peak voltage Upeak
Rated A.C peak voltage, permissible A.C peak voltage in continuous operation.

1.7 Voltage Rise Time du/dt
This value shows the maximum voltage rise or fall time, it is expressed in volts per microsecond, and cannot overcome.

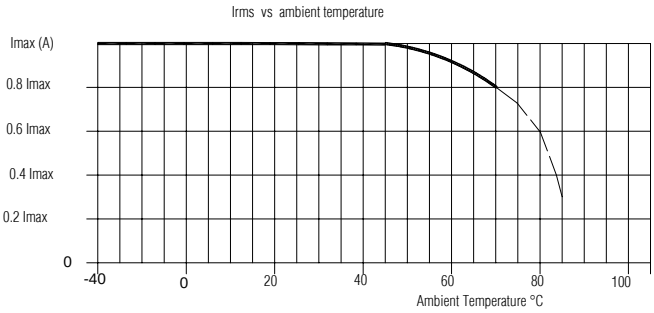
1.8 Maximum non-repetitive rate of voltage rise (du/dt)s
Peak rate of voltage rise that may occur non-repetitively and briefly in the event of a fault.

1.9 Voltage Test between terminals $U_{t\text{-}t}$
Routine test of all capacitors conducted at room temperature, prior to delivery. A further test with 80% of the test voltage stated in the data sheet may be carried out once at the user's location.

1.10 Voltage Test between terminals and case $U_{t\text{-}c}$
Routine test of all capacitors between short-circuited terminals and case, conducted at room temperature. May be repeated at the user's location.

1.11 Peak Current I_{peak}
Maximum permitted repetitive current amplitude during continuous operation
Ipeak = Cn x (du/dt)

1.12 Maximum Current I_{max}
Maximum rms value of permissible current in continuous operation. The values given in the data sheets are related to either the specified maximum power dissipation or the current limits of the connection terminals



1.13 Non-repetitive Peak Current (surge) I_s
Maximum current that may occur non-repetitively and briefly in the event of a fault. Maximum count 1000 times with the duration of not more than 50 ms each.

$$Is = Cn \times (du / dt)\ s$$

1.14 Equivalent Series Resistance ESR
Equivalent resistance representing the sum of all Ohmic resistances occurring inside the capacitor. Essential for calculation of the current dependent losses.

1.15 Self-inductance L_s
Represents the sum of all inductive elements which are, for mechanical and construction reasons, contained in any capacitor.

1.16 Insulation Resistance I.R.
The insulation resistance between terminals is expressed by meaning of the discharge time constant R.C. Measured for 1 minute at 100 Vdc and at 25±5°C. The time constant (s) of a capacitor is the product of IR and capacitance:

$$s = M\Omega \times \mu F$$

1.17 Resonant Frequency F_r
The capacitance and self-inductance of any capacitor form a series resonant circuit. Above the resonant frequency, the inductive part of this LC-circuit prevails. The capacitor would then behave as an inductor.

$$Fr = \frac{1}{2\pi\sqrt{Cn \times Ls}}$$

1.18 Dielectric Dissipation Factor $\tan\delta_0$
Constant dissipation factor of the dielectric material for all capacitors in their rated frequency.

1.19 Dissipation Factor $\tan\delta$
Dissipation factor calculated as: $\tan\delta = \tan\delta_0 + 2\times\pi\times f \times Cn \times ESR$

1.20 Thermal Resistance R_{th}
The thermal resistance indicates by how many degrees the capacitor temperature at the hotspot rises in relation to the dissipation losses.

1.21 Maximum Power Dissipation P_{max}
Maximum permitted power dissipation for the capacitor's operation.

$$Pmax = \frac{Ths - Te}{Rth}$$

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1.22 Ambient Temperature T_e
Temperature of the surrounding air, measured 10 cm away and at 2/3 of the case height of the capacitor.

1.23 Hotspot Temperature T_{hs}
Temperature at hottest spot inside the capacitor

1.24 Lower Category Temperature T_{min}
Lowest permissible ambient temperature at which a capacitor may be used.

1.25 Upper Category Temperature T_{max}
Highest permissible capacitor temperature during operation, i.e. temperature at the hottest point of the case.

1.26 Rated Energy Contents W_n
Energy stored in the capacitor when charged at rated voltage.

$$Wn = 1/2 \times Cn \times (Un)^2$$

1.27 Clearance in air L
The shortest distance between conducting parts of the terminals or between terminals and case.

1.28 Creepage distance K
The shortest distance along an insulated surface between conducting parts of the terminals or between terminals and case.

1.29 Altitude
The maximum allowable altitude is 2000 meters. As the barometric pressure decreases, the terminal arc-over susceptibility increases. Heat cannot be properly dissipated operating at high altitude and can result in high losses and eventual failure.

1.30 Storing Temperature
The range over which the capacitor can be stored without any applied voltage, with no degradation is - 40 to + 85 ˚C.

1.31 Life Expectancy L_e
Above all, the expected life of the capacitors depends on the internal temperature during operation, and the field strength in its dielectric.
Life expectancy versus voltage

$$Le = Ln \times (Un/Uw)^8$$

Le = Life expectancy at operating voltage (h)
Ln = Life expectancy at nominal voltage (h)
Un = Nominal voltage (v)
Uw = Operating voltage (v)

Life expectancy versus temperature

$$Le = L_{To} \times 2^{(To-Ths)/7}$$

Le = Life expectancy at operating temperature (h)
L_{To}= Life expectancy at 70˚C (h)
To = Reference temperature (70˚C)
Ths = Hot spot case temperature (≤ 70˚C)

2. Mounting and Operating Instructions

2.1 Overpressure Disconnector

When mounting capacitors with overpressure disconnectors, make sure that the elastic elements of the fuse are not impeded.
This means:

- The connecting leads must be sufficiently elastic.
- There must be enough space left for expansion above the terminals of aluminum-cased capacitors (stated for the individual type).
- The folded crimps must not be held by retaining clamps.
- The elastic bottom of capacitors in round steel cases must be free to move.

2.2 Mounting position

Capacitors can be mounted in any position except SMA series (Capacitors of SMA series can only be mounted upright, i.e. terminals on top). But the following exceptions to the rule are possible:

- Capacitors in aluminum cases with voltage ratings up to 3600 V and capacitors in rectangular steel cases may also be positioned horizontally.
- At higher voltages or for capacitors in round steel cases, horizontal positioning is also permissible. But consult the manufacturer first.

2.3 Mounting

The threaded bolt on the bottom of aluminum cases with a diameter of ≤ 60 mm and a height of ≤ 160 mm may be used for attachment if vibration stress does not exceed 5 g. For larger dimensions and vibration of > 5 g, the capacitors should be mounted by clamps, rings, etc.

Mounting with threaded bolt:

Threaded bolt	Mounting hole	Maximum torque
M10	12mm	6Nm
M12	16mm	8Nm

2.4 Terminals

For terminal bolt and nut tightening torques, refer to the individual datasheets. The terminal torque must not act upon the ceramic. So the lead should be locked between two nuts.

Internal thread(female terminal)	Maximum torque(N*m)
M5*8	2.5
M6*8	4.5
M8*8	8.5

2.4.1 Minimum terminal connection cross-sections in accordance with VDE/DIN 0100 part 523 and 430,group 2.

For the electrical terminals on ceramic lead-throughs only flexible leads should be used so that these lead-throughs are guarded against mechanical stress.
The outer leads of the capacitor should be dimensioned so that no heat is conducted into the component. You are advised to scale these leads so that heat is conducted away from capacitor terminals.

2.5 Grounding

Either a threaded bolt or a strap serves for grounding to VDE 0100. Grounding is omitted for single-pole and fully insulated capacitors. The layer of varnish beneath the clamp should be removed when grounding with a metal clamp.

2.6 Safety precautions

Observe appropriate safety precautions in use (self-recharging phenomena and the high energy contained in capacitors).

3. End of use and disposal

The materials used in capacitors for power electronics from EACO do not exceed the limits for chemical substances specified in the following national regulations:

- Chemicals prohibition regulation,
- CFC halogen prohibition regulation.

Our capacitors for power electronics contain no means of impregnation with PCB. Capacitors without PCB for power electronics are not explicitly mentioned in the waste qualification regulations. From this it could be deduced that they do not have to be disposed of as "waste requiring special supervision".

Because of our special commitment to and responsibility for the environment, we ask you to take every care when disposing of capacitors. We recommend that you drain the impregnation oil out of the capacitor and send it to an oil refuse depot. The emptied capacitor can then be disposed of as a grease and oil soiled item of apparatus. In any case it is advisable to consult a waste disposal facility and to find out about the applicable regulations in force.

4. Delivery and packing

In the packing of products, EACO naturally supports the needs of protection of the environment.

In the words:

- Use of packing made of environmentally compatible materials.
  Reduction of packaging to the necessary minimum.
  We have implemented the following measures to ensure compliance with regulations governing the handling and disposal of commercial waste.
- Use of pallets.
- Securing of pallets by straps and edge guards of environment-friendly plastic (PE or PP). Stretch and shrink film (PE) are used.
- Shipping cartons are identified by the RESY symbol.
- Separating layers for pallets and cartons are primarily of paper or cardboard.
- Filler material consists of paper.
- Shipping cartons are sealed with recycled paper adhesive tape to ensure material of the same kind for disposal.
- We take our packaging back (especially product-specific packaging made of plastic). Nevertheless we request our customers to deliver cardboard products, corrugated board, paper, etc. to recycling or disposal operators in order to avoid unnecessary transport of empty packaging.

5. Application

5.1 Lifetime Statements vs. Failure Rate

Statements on lifetime can become misleading as they may imply unreasonable assumptions; with clever de-rating of temperatures and operating voltages, one may create the illusion that a capacitor should last a million hours or more, while such statement would be purely theoretical and impossible to prove (even more so that most of the design features used in modern capacitors have not been in use for more than 20 years and would therefore not be backed up by any empirical references).

Another problem with lifetime statements is that they do not inform about failures during the "rated" lifetime, and – in turn – may create the impression that after the expiration of the "rated" lifetime, the capacitor shall be exhausted,

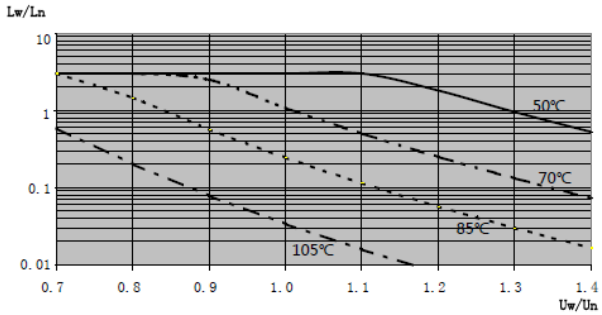
or fail. Any engineer will agree from own experience that in reality, there are components which may last much longer even under harder conditions, whilst others may fail prematurely.

5.2 Failure Modes

Plastic dielectric film capacitors can undergo two classic failure modes: open or shorts or high resistance shorts. In addition to these failures, capacitors may fail due to capacitance drift, instability with temperature, high dissipation factor or low insulation resistance. Failures can be the result of electrical, mechanical or environmental overstress, due to dielectric degradation during operation.

5.3 Operating life

The operating life of the capacitors depends on the internal temperature during operation, and the field strength in its dielectric. The capacitors have been designed for an average service life of 100,000h (permitted failure rate 3%). These values are rated for the hotspot temperatures specified in the selection charts. The following diagram demonstrates the correlation between service life, temperature, and operating voltage.



WARNING

EACO Capacitor Inc. is not responsible for any extent of possible damages to persons or things, of any kind, due to improper installation and application of capacitors for power electronics.

Misapply capacitors for power electronics might cause damage to the components, their characteristics modification and a decrease of their reliability and expected life.

The products of this catalogue are not suitable for applications “Across the Line”.

Personal Safety

Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from expulsion of oil or melted material due to mechanical disruption of the capacitor.

Don't dispose of capacitors in fire, explosion may result.

Before using capacitors in any application, please read this Technical Information carefully. Special care should be taken to assure that the capacitors are proper for your application and that warning and instructions for use are followed as well.

Check in the intended application and operating conditions of the capacitor before using in any product to be sure that the capacitor is proper for your application.

声 明

意壳电容器有限公司对于任何由于不当的安装或使用电力电容器时所带来的个人或者财产损失概不负责。

对电力电容器的误用可能会损坏元件，改变元件性能参数并降低可靠性和寿命。

此数据表中的产品不适用于跨接电路场合。

人身安全

电容器在不当的电气或机械场合使用时可能会有危险。并且在电容器开裂时可能发生油物或融化物飞溅，并造成人身伤亡或者财产损失的后果。

不要将电容器置于火中，以免引起爆炸。

在任何场合使用电容器之前，请仔细阅读此技术资料，谨慎使用，以确保电容器的正确使用，同时要严格遵守以上声明和说明书。

在任何产品中使用前，请查看电容器的适用范围和使用条件，以确保电容器的正确使用。

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